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| 10/030,235 | 03/26/2002 | Tsutomu Mitani | 10873.828USWO | 5863 |
| 23552 | 7590 | 07/09/2004 | EXAMINER | |
| MERCHANT & GOULD PC P.O. BOX 2903 MINNEAPOLIS, MN 55402-0903 | | | VIJAYAKUMAR, KALLAMBELLA M | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1751 | |

DATE MAILED: 07/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/030,235

Applicant(s)

MITANI ET AL.

Examiner

Kallambella Vijayakumar

Art Unit

1751

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,5-10,12,14-20,22,24 and 26-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,5-10,12,14-20,24 and 26-32 is/are rejected.
- 7) ☒ Claim(s) 21 and 33 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/2/3.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

Detailed Action

- This application is a 371 of PCT/JP01/01475 filed Feb 27, 2001, and acknowledge the preliminary amendment filed 03/26/2002. Claims 1, 3, 5-10, 12, 14-22, 24 and 26-33 are currently pending with the application.
- The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.
- The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A (1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the examiner on form PTO-892 has cited the references and/or the applicant has provided IDS on PTO-1449, they have not been considered.
- The information disclosure statement (IDS) submitted on 03//26/2002, 04/22/2003, and 03/01/2004 have been considered and acknowledged by the examiner.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

- Claims 1, 3, 5-6, 8-10, 12, 14-20 are rejected under 35 U.S.C. 102(b) as anticipated by Mine et al (US Patent # 5,804,631) in view of Furukawa et al (JP 3176906).

Normally, only one reference should be used in making a rejection under 35 U.S.C. 102. However, a 35 U.S.C. 102 rejection over multiple references has been held to be proper when the extra references are cited to (SEE MPEP 2131.01):

- (A) Prove the primary reference contains an “enabled disclosure;”
- (B) Explain the meaning of a term used in the primary reference; or
- (C) Show that a characteristic not disclosed in the reference is inherent.

Mine et al disclose the composition of a conductive paste and packaging of the semiconductor devices, the paste comprising a dispersion of conductive particles of silver flake and silver dendrite with a particle size of 1-10 microns in a silicone resin, the weight ratio of flake/dendrite ranging from 80/20 to 20/80 that would meet the limitations of flake/dendrite ratio in Claim-1 and 10, particle size in claims-8 and 17, elastic adhesive resin in claim-9 and 18, and conductive metal component in claims 1, 3, 6, 10, 12 and 15. The paste composition comprised a dispersion of conductive particle in an amount of 50-2000 parts per 100 parts of the resin would meet the limitation of resin/conductive particle content in instant claims 1, 5, 10 and 14. The limitation of content of the conductive filler in the gap between the electrodes during packaging being higher and the conductive filler content being lower than the average content in the gap per the instant claims 10 and 20 would be inherent by virtue of restricted thixotropy for such a system

as shown by Furukawa et al (Abstract). The limitation of scratching of the surface of the protrusions in claim 20 would be anticipated while packaging due to the sliding of particles. The limitation of conductive filler being 75 wt% for the adhesive in the gap between electrodes in claim-19 would be anticipated, when the amount of conductive particles be at a maximum content of 70 wt% in the paste. (Col-13, Lines: 24-60; Fig-1, Col-16, Line-42-Col-18, Line 26).

All the limitations of the instant claims are met.

The reference is anticipatory.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

- Claims 1, 3, 5-10, 12, 14-20, 22,, 24 and 26-32 are rejected under 35 U.S.C. 103(a) as obvious over Mine et al (US Patent # 5,804,631) in view of Furukawa et al (JP 3176906) or Tsunaga et al (US 5,045,236).

Mine et al disclose the composition of a conductive paste and packaging the semiconductor devices, the paste comprising of conductive particles of silver flake and silver dendrite with a particle size of 1-10 microns dispersed in a silicone resin, with a weight ratio of flake/dendrite being in the range of 80/20 to 20/80, that would meet the limitations of flake/dendrite ratio in Claim-1, particle size in claims-8, elastic adhesive resin in claim-9, and conductive particulate in claims 1, 3, 6. Mine et al further teach coating of substrate particles with conductive metal coatings that would meet the limitation of claim-7. The content of conductive particle in the paste in an amount of 50-2000 parts per 100 parts of the resin would meet the limitation of resin/conductive particle content in instant claims 1 and 5.

A SPECIFIC EXAMPLE IN THE PRIOR ART WHICH IS WITHIN A CLAIMED RANGE ANTICIPATES THE RANGE “[W]hen, as by a recitation of ranges or otherwise, a claim covers several compositions, the claim is ‘anticipated’ if *one* of them is in the prior art.” *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (citing *In re Petering*, 301 F.2d 676, 682, 133 USPQ 275, 280 (CCPA 1962)) MPEP 2131.03.

The scratching of the surface of the protrusions while packaging due to the sliding of particles during packaging would be obvious. The limitation of a pressure of 0.01 MPa in claim 22 would obviously be met by squeezing the paste from a tube. Further the limitation of the amount of conductive filler being 75 wt% in the adhesive within the gap between electrodes would be anticipated, when the amount of conductive particles would be at a maximum content of 70wt% in the paste and by virtue of varying thixotropy of such pastes. (Col-13, Lines: 24-60; Fig-1, Col-16, Line-42-Col-18, Line 26; see Furukawa in later paragraphs).

Mine et al do not teach or suggestive of the content of the conductive filler in the gap between the electrodes during packaging being higher and the conductive filler content being lower than the average content in the gap per the instant claims 10 and 20

Furukawa discloses the variation in the thixotropy of paste comprising of copper flakes and copper dendrites, and the limitation of content of the conductive filler in the gap between the electrodes during packaging being higher and the conductive filler content being lower than the average content in the gap per the instant claims 10 and 20 would be obvious by virtue of restricted thixotropy for such a system as shown by Furukawa et al.

Tsunaga et al teach the use noble metal coated base metal particles such as Ag coated over Cu in reducing the cost and improving the conductivity and solder-ability of the product in the packaging of devices (Abstract).

In the alternative that the disclosure by Mine et al be insufficient to arrive at the limitations of the instant claims by the applicants, it would have been obvious to one of ordinary skill in the art to make any obvious/modifications to the composition and/or packaging of the semiconductors to benefit from improved contact with good conductivity and resilient connections, because Mine teaches and further suggestive of these aspects, and/or optionally include noble-metal coated conductive particles per the teachings of Tsunaga et al to benefit from reduced cost, improved conductivity and soldering properties because Tsunaga teaches and suggestive of these aspects in the analogous art, and with the expectation of reasonable success in obviously arriving at the limitations of instant claims by the applicants.

Allowable Subject Matter

- Claims 21 and 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Prior art of record neither teaches nor suggestive of packaging element and packaging method meeting the limitations of instant claims by the applicants.

Conclusion

- The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.: Murata Mfg (JP 09-245522), Matsushita (JP 11-1152458, JP 11-092727), Hitachi (JP 06-325617), Sumitomo (JP 01-165564) Furukawu (JP 05-020923), Chemenko et al (SU 1098441), Hanawa et al (US 6,395,332) and Nakayoshi et al (US 5,173,765).
- Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kallambella Vijayakumar whose telephone number is 571-272-1324. The examiner can normally be reached on M-Th, 07.00 - 16.30 hrs, Alt. Fri: 07.00-15.30 hrs.
- If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

- Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kmv
June 26, 2004


Mark Kopec
Primary Examiner